



Linguistics and Literature Review (LLR)

Volume 4, Issue 1, March 2018

Journal DOI: <https://doi.org/10.29145/llr>
Issue DOI: <https://doi.org/10.29145/llr/41>

ISSN: 2221-6510 (Print) 2409-109X (Online) Journal homepage: <http://journals.umt.edu.pk/llr/Home.aspx>

Changing Trends from Traditional to Technology Based Approach: Speech Language Pathologist's Preferences for Computer Mediated Aphasia Therapy (CMAT) in Pakistan

Nadir Ali

To cite to this article: Nadir Ali (2018): Changing Trends from Traditional to Technology Based Approach: Speech Language Pathologist's Preferences for Computer Mediated Aphasia Therapy (CMAT) in Pakistan, Linguistics and Literature Review 4(1): 54-77.

To link to this article: 10.29145/llr/41/040105

Published online: March 31, 2018

Article QR Code:



A publication of the
Department of English Language and Literature
School of Social Sciences and Humanities
University of Management and Technology
Lahore, Pakistan

Changing Trends from Traditional to Technology Based Approach: Speech Language Pathologist's Preferences for Computer Mediated Aphasia Therapy in Pakistan

Nadir Ali

University of Management and Technology- Lahore, Pakistan

ABSTRACT

Aphasia is an acquired neurological disorder of communication with a range of language impairments. Aphasia rehabilitation is becoming an important concern in clinical aphasiology. Traditional approaches for rehabilitation are being practiced. In addition to this, computer-based strategies are also employed in aphasiology. In this study, a qualitative phenomenological research approach is used to gain an understanding on how the SLPs of Pakistan perceive the changing trends of clinical practice in aphasia towards technology-based treatment method. This study presents lived experiences and preferences of the SLPs regarding changing trends from the traditional approach to the technology-based method. Ten SLPs participated and were recruited through purposive sampling. The participants were included if they were qualified SLPs and had at least 2 years of experience. The data was collected through audiotapes of detailed group discussions with the participants. The data was analyzed by using thematic analysis. The findings were grouped into five themes: traditional rehab activities, auditory and visual input, cost-effective approach, access and prognosis note. A range of sub-themes were also identified. The findings suggest the SLPs' preferences are showing limited trends towards adapting the technology-based method.

Keywords: aphasia, CMAT, speech therapy, SLP, rehabilitation

Introduction

Aphasia is an acquired neurological disorder of language and communication dysfunction involving symptoms on all levels of (language modalities and skills) linguistic competence (Ali, Rafi, Khan & Mahfooz, 2016). Aphasia affects spoken communication as well as written. It can impede speaking, comprehension of linguistic input, reading and writing, having affected both expressive as well as receptive communication (Pema, 2016).

CONTACT Nadir Ali at dr_nadir_ali@yahoo.com

A patient with aphasia presents with a range of language dysfunction, such as, laborious retrieval of words and, sometimes, in severe cases with almost no expressive skills, impaired repetitions abilities, fluency, grammaticality and comprehension, and reduced ability to communicate in social interactions (Ali et al., 2016; Beeson, Bayley, Shultz & Rising, 2018; Youmans, Holland, Muñoz & Bourgeois, 2005). Lost communication negatively affects their physical, psychological, functional and social events (Johansson, 2012; Dickey et al., 2010).

A variety of traditional speech rehabilitation options are available for speech language pathologists (henceforth called as SLPs), e.g., The Copy and Recall Therapy (Thiel, Sage & Conroy, 2015), the Visual Image Communication (VIC) therapy (Wertz, de Riesthal, Irwin & Ross, 2009), the Function Communication Therapy (Stahl, Mohr, Dreyer, Lucchese & Pulvermüller, 2017), the Promoting Aphasic's Communicative Effectiveness (Raglio et al., 2016), the Stimulation Response method and the Melodic Intonation Therapy (Bhogal, Teasell & Speechley, 2003; Manasco, 2017). Other traditional methods are linguistic-oriented learning approach, prompting approach, response elaboration training (Manasco, 2017), constraint-induced aphasia therapy (Raymer, 2009; Segismundo, 2017; Zhang et al., 2017) and drawing methods (Parrish, 2014).

An emerging literature in the field of neuroplasticity research proposes that intensive speech and language treatment can provide greater rehabilitation for patients with chronic aphasia and they carry on establishing language regaining for years post-stroke (Breitenstein et al., 2017; Cherney, Patterson & Raymer, 2011; Lucchese, Pulvermüller, Stahl, Dreyer & Mohr, 2017; McKelvey, Hux, Dietz & Beukelman, 2010; Mohr, Stahl, Berthier, & Pulvermüller, 2017; Patterson, Raymer & Cherney, 2017; Stahl et al., 2018; Swales, Hill & Finch, 2016; Varley, 2011). For example, in the Intensive Comprehensive Aphasia Programs (ICAPs) speech therapy is given for 3 hours daily for a period of minimum 2 weeks (M. L. Rose, Cherney & Worrall, 2013). Nevertheless, the minimum levels of aphasia treatment intensity are not being met in actual clinical practice (Code & Heron, 2003; Code & Petheram, 2011). Similarly, constraint-induced aphasia therapy also emphasizes the significance of massed practice for the improvement of spoken skills of patients with chronic aphasia (Anderson, 2017; Segismundo, 2017). However, providing the facility of intensive therapy to patients with chronic aphasia can be burdening and expensive for patients already suffering with socio-economic trauma due to restrictions and immobility imposed by aphasic consequences (Gallacher, May, Langhorne & Mair, 2018).

The ability of the traditional face to face, individual, in-session rehab service delivery approach to provide intensive aphasia services is limited due to a number of factors, such as, restrictions of being housebound and immobility imposed by aphasic consequences, increasing caseloads due to improper proportionate of SLPs and patients with aphasia, and insufficient healthcare services (Cubit & Meyer, 2011; Rose, Ferguson, Power, Togher & Worrall, 2014). Similarly, a patient with aphasia whose main accessibility hurdles are mobility problems and who lives in remote areas and suburbs of large cities is also restricted having rehab services due

to limited availability of qualified SLPs based in rural areas and consequently they need to travel to avail rehab services to big cities (Coleman, Frymark, Franceschini & Theodoros, 2015; Dunkley, Pattie, Wilson & McAllister, 2010; Fairweather, Lincoln, & Ramsden, 2016; Freckmann, Hines & Lincoln, 2017; Tucker, 2012). As a result, to meet minimum levels of intensity requirements for aphasia treatment and to provide equal access to rehab services, SLPs and researchers are left with options to search for new rehab service delivery approaches that should be cost-effective and easily accessible (Code & Petheram, 2011). One such method that may be a possible solution to the concerns of intensity of therapy, accessibility and limited resources is the usage of digital technology gadgets for aphasia therapy such as, computer mediated approach, in which the therapist is not physically present (Lee, Fowler, Rodney, Cherney & Small, 2010; Moffatt, Pourshahid & Baecker, 2017). Thus, aphasia therapy will not be restricted in absence of the therapist and clinical or speech lab environment, allowing patients to engage in speech therapy independently whenever and wherever they choose (Katz, 2010).

With the advent of digital technology, computer mediated aphasia therapy programs put forward to get benefits for patients with aphasia (Palmer et al., 2012; Pulvermüller & Berthier, 2008). A study states the effectiveness of computer mediated programs for management of aphasia (Pema, 2016). The use of computers is becoming increasingly involved particularly in the treatment of patients with aphasia (Carstoiu, Oltean, Nica, & Spiridon, 2017; Des Roches & Kiran, 2017; Des Roches, Mitko & Kiran, 2017; Gauthier et al., 2017; Kelly, Kennedy, Britton, McGuire, & Law, 2016; Palmer et al., 2012; Palmer, Enderby, & Hawley, 2007; Ramsberger & Marie, 2007). In a computer mediated speech therapy, the participants rejuvenated their speech and they spent 37% more time with computerized way of treatment than with traditional aphasia treatment methods. This study concluded that computerized treatment was as effective as traditional therapy (Palmer et al., 2007).

Despite the fact that evidence from research studies are supporting computer based programs for management of aphasia (Hall, Boisvert & Steele, 2013; Mashima & Doarn, 2008; Palmer et al., 2012; Steele, 2013), this service delivery is not being adopted and utilized to its full potential (van de Sandt-Koenderman, 2011), particularly in Pakistan. Hence, the aim of this study is to explore SLPs' perceptions and lived experiences regarding the preferred use of computer mediated aphasia therapy to better enable the patients with aphasia to receive its unique benefits considering the poor socio-economic circumstances of the country, accessibility issues towards rehab services for patients with aphasia and healthcare services infrastructure in general.

In clinical practice for aphasia rehabilitation in Pakistan, computer mediated aphasia therapy (CMAT) is almost negligible. Neither CMAT is being practiced in Pakistan, except very scanty research work (Shamim, Naz & Khan, 2017; Shamim, Naz & Tariq, 2017), nor any dialogue for implementing digital technology in aphasia treatment is under consideration. The implication of this study is to introduce the growing global trend of using technology in clinical practice for aphasia treatment that is changing from traditional approaches towards usage of digital technology (Hansen, Bjornsen & DeVeny, 2017; Konnerup, 2018; Kurland, Wilkins &

Stokes, 2014; McCue, Fairman, & Pramuka, 2010; Moffatt et al., 2017; Peterson, 2010; Theodoros, 2012), whenever and wherever is needed.

Considering the background of the study following research questions were formulated,

- 1- What are the preferences of SLPs in implementing the CMAT program in aphasia rehabilitation centers in Pakistan?
- 2- Whether or not the SLPs are observing the changing trends in Pakistan towards using latest aphasia treatment technology?

Material and Method

Participants

The researcher selected ten SLPs as the participants of this study. The participants were recruited through the purposive sampling technique. Inclusion criteria: university graduates in Speech Language Pathology, having at least 2 years' experience of clinical practice in aphasia rehabilitation. The participants were recruited through the Executive Speech Clinic (ESC), based at Riphah School of Rehabilitation Centre, Riphah International University Lahore. This recruitment via ESC was either face-to-face, telephonic or through e-mail invitation.

Demographics of the Study Participants

Out of 10 participants, 3 were male and 7 were female SLPs, with a mean of 5.7 years of experience of clinical practice in aphasia rehab services ($SD = 3.66$, range= 2-15). The participants were working in a variety of work places (see Table 1).

Table 1. Demographics of the Participants

Participant	Qualification	Work experience in aphasia	Current workplace	How many aphasia patients may be a case of CMAT
1	MS	5	CMH(inpatient rehab)	Very less
2	MS	5	FMH(inpatient rehab)	More than half
3	PhD	15	Research	Less than half
4	PhD	9	Research	Majority of patients
5	PhD	7	Research	Majority of patients
6	MS (final sem)	2	Private hospital	Less than quarter
7	MS (final sem)	4	Public hospital	Very less
8	MS (final sem)	3	Private hospital	Less than quarter

9	MS (final sem)	4	Private hospital	Almost no
10	MS (final sem)	3	Public hospital	Very less

Note. CMAT, Computer mediated aphasia therapy; Rehab, Rehabilitation

Research Design

The researcher chose the phenomenological research approach for this study. Phenomenology is a method of inquiry that attempts to understand how a specific group of human perceive or experience a particular phenomenon through analyzing and interpreting people's description of the experience of that phenomenon (Creswell & Poth, 2017; Eatough & Smith, 2017; Hannes & Bennett, 2017; Kozin, 2018). Thus phenomenology attempts to study structures of conscious experience, understand a person's perception and understanding of a specific situation (Van Manen, 2016).

One of the most often used data collection tools in phenomenology are focused groups (Redmond & Curtis, 2009; Stewart & Shamdasani, 2014). In this study focus group discussions were used as data collection procedure, which was considered suitable as it allows the researcher to observe and explore the experiences, attitudes and preferences of the participants and provide a cumulative view of the topic under consideration (Borley & Hardy, 2017; Faris, 2017; Marzán-Rodríguez, Varas-Díaz & Neilands, 2015).

Using latest guidelines, for conducting focus group discussion, from Stewart et al. (2014), questions were constructed before discussion to guide the participants' discussion activity regarding changing trends in aphasia therapy practice in Pakistan. A mediator, who was an undergrad from SLP, guided the participants of the group by offering to present the pre-determined questions, endorsing equal participation and ensuring unbiased prompting clues if required for further enrichment of a particular discussion point (Stewart & Shamdasani, 2014).

Three focus group discussions were conducted in different times and places. The 1st focus group was consisted of two participants who were primarily engaged in clinical practice in hospital setting, one of them working as SLP in CMH, Lahore and the other member as SLP in FMH, Lahore. These participants attended the group discussion session personally in the Speech Clinic, FMH Lahore. The 2nd focus group consisted of three participants who were primarily researchers and also engaged with teaching; two of them were affiliated with Riphah School of Rehabilitation Centre, Riphah International University, Lahore and the 3rd participant with the University of Punjab Lahore. These participants attended the group discussion session personally in the Speech Lab of Riphah School of Rehabilitation Centre. The 3rd group consisted of five participants; all of them were engaged in clinical practice in different private and public sector teaching hospitals. The participants of this group either attended the focus group discussion in person (n=4) or via telephonic conversation through using mobile speaker application (n=1).

The reasons to divide the sample into three focus groups were manifold. The first aspect to divide the sample was to allow the participants to have sufficient time and chance to provide in-depth perception and explanation of the opinions (Agan, Koch & Rumrill, 2008; Swales et al., 2016). Furthermore, these multiple focus groups were used to triangulate the research findings

and ensure the credibility of the data set (Agan et al., 2008; Creswell & Poth, 2017). If commonly emerging findings (themes) were observed across the focus groups, it was considered to ensure validity.

The researcher tried to maintain homogeneity within the group regarding the primary role, researcher or clinician, of the participants. It ensured convenience and comfort in expressing their experiences, and allowed to share their opinions to facilitate the focused discussion within the group as obvious differences between backgrounds of the participants can impede the ease (Redmond & Curtis, 2009). However, the use of heterogeneous group of participants in a study has an important role when the focus group is meant for exploratory objectives (Redmond & Curtis, 2009), which was accomplished by involving both the researchers and the clinicians of diverse affiliations.

Data Collection

The participants were informed and explained about the purpose and framework of the study prior to the focus group session for the data collection. Similarly one of the participants provided telephonic informed consent and invitation for participation in the study as participant was given through email. One undergrad SLP as mediator was involved in each of the focus group sessions who initiated the discussion and summarized the ideas of group members. Each focus group discussion was of one hour and the researcher managed to audio-record the sessions for transcription purpose.

Research Material

In phenomenological framework of inquiry very open questions are needed to be asked (Creswell & Poth, 2017). A set of questions based on the researcher's knowledge obtained from literature review of clinical aphasiology and current practices of aphasia management was formulated and trialed a pilot focus group (n=2) discussion, e.g., What type of treatment options do you prefer for your patient with aphasia?; How do you decide to select the most appropriate method from many?; What are your criteria of treating approach?; How do you provide feedback to your patients?, and how do you provide to those who are using some digital gadget for aphasia treatment?; What is your experience in using computer program for aphasia treatment?

Feedback of participants from pilot study suggested pointing the focus of the study questions particularly to observe the changing trends of aphasia therapy towards using computer mediated programs. Due to this directing feedback, the pilot study results are not presented here. The questions were revised as,

- 1- What are the advantages and limitation of traditional ways of aphasia therapy?
- 2- What are the advantages and limitations of computer mediated aphasia therapy?
- 3- What are your preferences towards the adaptation of CMAT program?

Data Analysis

The researcher transcribed the audio recordings of focus group discussions and analyzed the transcribed verbatim using thematic analysis (Braun & Clarke, 2006; Terry, Hayfield, Clarke & Braun, 2017). The purpose of the analysis was to determine, analyze and report the commonly emerging themes across the sample. The procedure of thematic analysis involved the researcher familiarizing with the data through multiple readings of the transcript and noting main ideas from that, finding individual meaning units through identifying the statements in the transcripts that have important information, and making a compressed summary code, grouping these codes into possible themes, revising the themes, describing and naming the themes and representing the emerging findings (Braun & Clarke, 2006; Terry et al., 2017).

The procedure of data analysis was conducted with the transcript of the 1st focus group, followed by the other transcripts individually and then combined. All steps of thematic analysis procedure were done by the researcher, and the potential themes were revised and reviewed by an expert researcher and SLP clinician (MS SLP) to ensure no important meaning units were underestimated or missed. The researcher discussed discrepancies with the expert until a consensus was achieved (Husbands, Jowett, Barton & Coast, 2017). The summary of the emerging themes was discussed with the participants for member checking and they were asked to corroborate if any divergence in the interpretation of the group discussion took place. All the participants of study agreed with the findings.

Credibility Measures

The researcher implied three methods to ensure the integrity and credibility of the findings. First, the results of the study were triangulated through dividing the participants into 3 focus groups. Separating the participants allowed the different datasets to be compared and cumulated to formulate the commonly emerging themes. Secondly, the researcher himself revised all the transcripts and then sent to the reviewer for expert opinion to rule out any discrepancy before completing the thematic analysis to ensure that emerging themes were properly identified. Finally, for member checking, a precise summary of the themes was discussed with the participants, who verified the interpretations of the group discussions. Reliability measures were also considered in the study which included: on one hand the same researcher and the mediator were conducting all the focus groups discussion activities; and on the other hand pre-determined research material and focus group discussion guide were established and followed to make sure consistency with its administration. The element of transferability was also ensured through recruiting SLPs as the participants of study from a variety of workplace settings and the participants with diverse experiences with research and clinical backgrounds.

Ethical Considerations and Approval

Ethical approval for the present study was granted by the ethical review committee of the Department of English Literature and Language, University of Management and Technology Lahore. The researcher followed the ethical consideration of the framework of Health and Social Care particularly with regard to phenomenological framework (Walker, 2007). These considerations include careful planning for dealing with group discussion, preparation of the documents; written consent for the participants, brief description of the study perspectives and pre-determined question format. Ethical consideration during group discussions; drawing attention to points which are not still clear, clarifying the misunderstanding if any, considering any sign from the participant to have any break or quit the activity, insuring the anonymity of the participants and taking consent for mentioning their affiliation with institutions, if required (Walker, 2007).

Results

Five major themes were identified from the thematic analysis of the data set that summarized the preferences of the participants with reference to their preferences towards using CMAT in clinical practice for aphasia management: 1- Traditional Rehab activities, 2- Auditory and Visual input, 3- Cost-effective approach, 4- Access, 5- Prognosis note. Each of major themes contained subthemes that are supported by the quotes of the participant as identified in Table 2.

Table 2. Summary of the Themes and Subthemes of the Participants' Preferences of Computer Mediated Aphasia Therapy

Themes	Subthemes	Supporting Data
1 Traditional Rehab Activities	Variety of Tasks	...which area is strong—if melodic area is strong we start with melody, —we use tailor to fit, —impairment based tasks, but maybe some type of activity participation tasks also. Very powerful personalized type of tasks can be implied.
	Motivation and Counseling	Only a feel of touch can motivate him—he maintains his concentration during session due to that association. Observing his motivational level through watching his output. All the advantages of clinical services e.g., participation, motivation, encouragement and acknowledge are available in traditional method.
	Customized Input	Lot of information for patients and caregivers can do—a good take home message, —is the area pantomiming, is it intonation, is it melody—matters, according to this we get that therapeutic concern. It can direct the therapy to that particular goal—good personalized decision for treatment of patient. Other senses' use is very important, e.g., smells of 'amlii' (Tamarind).
	Feedback	...language can be retaught—taking good and appropriate decision at the spot. Maintaining or changing our input through watching patient's feedback. There is less feedback and motivation in CMAT—that is why it may become monotonous, —what has developed in him, we observe and jump to next step; it may be difficult in CMAT. It's look like a drawback of CMAT that it has

			no good feedback.
2	Auditory and Visual Input	Prominent Stimuli	Simple input in the situation is needed. Pics should be clear. Images of his own significance will have better effect.
		Variety	Patient can enjoy variety of activities in traditional method. We can use melodic activities, —can show cards with cues, intonation. Yard stick varies from patient to patient.
		Appropriacy	There are certain sounds where patients are prone to improve. Our memory embedded language is convenient to reproduce speech, some times. You need to put your therapy back and forth. I select the words from his real life situation. I do not focus on sounds, rather I see him with his background. Which version of CMAT will you introduce—Urdu, Punjabi, Sraiki, Pashto or Sidhi etc.
		Patient's Compliance	...then compliance matters a lot. If we provide these types of CMAT program then like Panadol tablet everybody will start doing by his own at home—mishandling will start. Patients won't refer to SLPs at appropriate time. Comorbid element may effect patients' compliance.
		Digital Inputs/Feedback	Recovery rate will lower down. Variety may be the main issue here. Monotonous inputs will not work. Irrelevant prompting will lower patients' compliance. Delayed digital feedback is misguiding.
3	Cost-effective Approach	Affordability	...issues do not come back. CMAT insure financial issues. Yes cost does matter. They are not going to pay 1000 Rupees for some 'words' only, —you are just chatting what else.
		Accessibility	...patient who have problem to reach SLP for them it is beneficial. Services are available in big cities, if we talk about periphery yes—travelling cost is there.
		Long Term Rehabilitation	...we will have visits for months long. Process of rehabilitation of speech is slow and it is long term treatment. Lifelong event.
		Unprivileged Patients	...from periphery may not enjoy the technology. When unprivileged patient has no money for travelling to SLP then how he will purchase a computer for program to run.
		Acknowledgement	Three blind fold is actually on both sides. Candidacy of speech therapy....SLPs failed to establish this candidacy here. SLP is still in denial phase. Cannot able to grow this system. Our profession.....it's not recognized. Insurance companies are not insuring speech therapy. Cannot develop that association. Patient maintains his concentration and association develops that is acknowledged. It's a personalized type of therapy.
4	Access	Usability	...its use should under SLPs' supervision only. Therapist can use that in some group therapy. Patients can understand only in their own language. And maintenance phase can be continued with CMAT at home. Generalization will be done in front of SLP, maintenance is Yes. In maintenance relapse can occur, so to handle that relapse we can use CMAT program at home. At treatment level it can be beneficial as well.
		Computer Literacy	One thing is important....my grandfather will not use it. It vary from patient to patient, some of them cannot able to use that. Software development is very rare here. Limitation of computer program—education is the main factor. Even educated people are not using computers.
		Real-world Hazards	Internet brake down, load shedding will matter. Nor internet facility is available in peripheries.
		Economy	Online or computer based program may have some benefits, that

			may be cost effective facility of time safety. Facility of repetition...you can watch a program many a time...memorization can be good.
5 Prognosis Note	Physical Presence	Change of environment is necessary to see patient's disability. Understanding between patient and SLP only develop in physical session. He can have clarity only in—person session. Physical presence is productive...rappor and counseling is important.	
	Remote Monitoring	I told her make clips of your sound and Whatsapp me. It can be recorded and discussed virtually—it has role. I had a patient and I gave her online treatment and it was 75% effective. Technology is in our hand—we can use it.	
	Homework Activity	In CMAT-- could be like game activity—e.g., utter 'a' how much uttered with frequency, the balloon will inflate that much. A carryover activity is good.	
	Maintenance	In maintenance it is useful—no denying factor. To what extent it is effective, is questionable. Yes maintenance phase for implementing CMAT is appropriate. After generalization CMAT will work.	

Theme 1. Traditional Rehab Activities

The discussion of the participant regarding their preferences for aphasia management amongst the prevailing traditional rehab and other technology mediated practices revealed four subthemes: variety of tasks, motivation and counseling, convenient and customized input and feedback. All the participants mentioned that traditional methods of rehab activities have a variety of tasks available for SLPs to implement for their patient's engagement in speech therapy in-person sessions. This point was agreed upon that a range of expressive language task, semantic impairment-oriented activities, phonology-oriented tasks are typically available. Similarly, activities addressing syntax, pragmatics, figurative and abstract language, written and functional communication according to their real life preferences are traditionally available in such rehabilitation activities. It was again agreed that traditional approaches to aphasia rehabilitation have a full range of tasks available to SLPs with a free choice of selection depending upon its need and convenience.

It was agreed that motivation and counseling were identified as remarkable features of traditional methods which are lacking to that extent in any other aphasia rehab approach. The participants argued that mostly aphasics referred to SLPs with diminished level of their morale towards daily life activities and prognosis of the disability and the first priority of every SLP are to motivate their morale and to have an extensive session for their counseling about the recovery of their lost communication. It was unanimously agreed upon point that in traditional approach the prime importance in the aphasia rehab activity goes to motivation and counseling.

In the subtheme of convenient and customized input, the majority of participants had consensus on this point that traditional method, as compare to others, has convenience to select which input particularly is required at the time according to the situation of patient's output and the improvement of symptoms observed. This customized input, rather than a fixed, that is essential for an appropriate output, is a conscious and concrete activity rather than a virtual one.

The majority of participants showed lot of concern regarding their feedback. They agreed that in practicing sessions, therapist provides prompting cues to facilitate their laborious activities for struggling word retrieval. This prompt feedback in the form of prompting and cuing may not be of that importance in virtual world. Patients respond according to the customized feedback the therapist provided; this ensures the interest and attention of patients in rehabilitation activities and its outcomes, otherwise it will become a monotonous repetition that may affect their recovery process.

Theme 2. Auditory and Visual Input

The participants' discussion identified six subthemes regarding the theme, auditory and visual input considering their preferences in using CMAT program or traditional rehab practices for aphasia patients: prominent stimuli, variety, appropriacy, patient's compliance, digital inputs and digital feedback. All participants of the discussion agreed that prominence of stimuli is of much importance for obtaining positive treatment outcomes and patients' motivation either in traditional or CMAT method of rehabilitation for aphasia patients. Stimuli either from auditory or visual input are important in way if they are presented prominently to patients. Most of the participants arrived on a consensus that achieving prominence of stimuli through any source of representation in traditional methods of treatment aphasia is easier than in CMAT program.

Majority of the participants were agreed that in traditional therapy modes they can easily provide different stimuli to stimulate their articulation which is difficult in virtual practice. The participants presented a number of practical suggestions about achieving prominence of stimuli if they ready to use CMAT in their clinical practice, including importation of some attractive food pictures that can even stimulate their olfactory sense along with stimulation of their motor activity. Similarly they suggested regarding CMAT program that patients can import their own videos of in-person sessions of therapy and can obtain the option to select stimuli following the video that meet the patient's treatment goals. The participants were of view that quality of pictures using as visual stimuli were also to be considered very important, that images in CMAT programs should not be child-like because they may not clearly portray the target.

The second subtheme of auditory and visual input was variety of stimuli. The importance of and need for a wide variety of stimuli in both the traditional and CMAT approaches was agreed upon by all. The participants agreed that extensive web formation for constructing a variety of stimuli that can be customized in traditional method, can serve the purpose in CMAT program rather than having limited option being presented repeatedly, irrelevant of the situation at time. They additionally suggested that computer programs that they have come across are not up to the mark and have lack of word categories, except nouns and verbs other words classes are ignored. Also one particular noun can have different versions that can be differentially presented to the patients but this feature in some consulted computer programs is lacking that needs to be have improved in CMAT program if constructed in some way in future.

Considering the variety of stimuli one important suggestion from six of the participants regarding CMAT was that in Pakistan we have multiethnic society, and within one ethnic

community we have many dialects, for this diversity the computer program should have been categorized into different versions considering different ethnic groups. Another suggestion upon which all participants were agreed was that there is a variety of aphasia disorders and within a particular diagnostic label there is a range of severity levels and comorbid factors that may further aggravate the disease which make therapist to take an appropriate decision for selection of which aphasia treatment strategy will be effective for that particular case and to what level the intensity of treatment is required. This can be easily achieved in tradition method of treatment but may require some kind of categorization and classification of CMAT program which can be able to provide appropriate treatment considering the class of aphasia disorder and its severity level.

Almost all the participants raised the point that the stimuli they present during their aphasia sessions are culturally relevant and appropriate to them because the therapist came to know their cultural affiliation and relevance while history taking activity of the patient considering the diverse nature of multicultural and multiethnic nature of the Pakistani community. The participants of the study were showed consensus on the issue that the computer based program available for aphasia in the international market are culturally inappropriate for the Pakistani population. The participant were of view that almost all available aphasia programs are using the linguistic stimuli constructed on English phonetics and phonology that their patients will not be able to relate to their own context, even if considering the educated ones of the community. For a future CMAT program in their clinical practice, in Pakistan, all of the participants agreed that linguistic stimuli need to be constructed upon Urdu phonetics and phonology and using Urdu vocabulary, as well as constructing versions in other main regional languages, like Punjabi, Sraiiki, Sindhi, Bloachi and Pashto that will provide the patients a modification to suit each individual patient, allowing them for task adaption from diverse cultural backgrounds.

Theme 3. Cost-effective Approach

The participant' discussion identified five subthemes regarding the theme, cost-effective approach towards aphasia rehab services for patients: affordability, accessibility, long term rehabilitation, unprivileged patients and acknowledgement. All the participants agreed that affordability is one of the main and undeniable limitations of traditional methods of aphasia rehabilitation. They accepted that the socio-economic condition of most of the patients do not allow them to continue this type of long standing therapy protocol, whereas it requires years of maintenance therapy particularly in the chronic phase of the disease. This vicious limitation restricts majority of them to stop continuing the treatment and depend upon superstitions prevailing in our society. But they were of the view that when we compare the patient's therapy goal with the achievement then money makes no difference. Another argument they presented was that one session of speech therapy takes 45-60 minutes, which is a requirement of this type of rehabilitation activity, approve the fee an SLP charges them.

Again unanimously they agreed that infrastructure of health care system for SLPs is not that much extensive and health units in small towns have almost no SLPs, so accessibility to services for speech rehabilitation is not easy job for every aphasic patient. Big cities have sufficient deployment of speech therapists but the caseload of aphasia patients is high, because aphasics from peripheries also referred to their nearest big city for consultation. Their travelling hazards, considering their disability level in mind, travelling and consultation expanses make them more depressed and indecisive towards availing treatment options. They agreed that accessibility of aphasia rehabilitation is one of great problem and this should be addressed in one or the other way. Considering the subthemes of affordability and accessibility they all were agreed that there should be some use of digital gadgets and virtual means to make it more affordable and accessible for masses of patients.

All the participants consistently mentioned that aphasia therapy is a long term rehabilitation process. It requires intensive, progressive and long standing post-treatment maintenance therapy for years. They were of view that for this type of requirement the alternative option of CMAT program can be considered. Six of the participants pointed out that after initial sessions of treatment and generalization phase CMAT can be referred to the chronic patients of aphasia to solve both issues of affordability and accessibility. So they agreed that CMAT program can positively work in maintenance phase of therapy rather than in treatment or generalization phases. Most of the patients from small cities and even from big cities are unprivileged, so they are not socially and financially able to continue this expensive long term therapy. The participants agreed that at least for these patients who are not able to consult frequently with SLPs and visit speech lab to attend aphasia group therapy, CMAT is a blessing provided this program should be utilized under the supervision of expert and qualified SPLs, not independently operating at their home without having any feedback.

The participants of discussion unanimously identified acknowledgement as an important subtheme under the heading of the theme, cost-effective approach. Almost all the participants agreed that speech and language pathology is underdeveloped and unwanted field of study in Pakistan. Doctors are not referring the cases that should be consulted with SLPs. The reason behind this unattended attitude towards this field may be due lack of awareness on the end of doctors about effectiveness of speech therapy. Although internationally this field is recognized but in Pakistan it is still in the denial phase even by experts of medical professions. So unfortunately on one hand acknowledgment of speech therapy is not achieved and on the other hand lack of awareness and formal education of patients worsen the situation. All the participants were agreed that before considering the question of the use of latest technology in aphasia treatment first organize the flexibility for this recognition, adaptation, acceptability and acknowledgement. They were of view that in this situation when they are not consulting properly with SLPs how come the question of CMAT program. If we provide this type of program, they will start using it, without having enough skills and this premature phenomenon will lead to the mishandling of the entire scenario with unexpected consequences.

Theme 4. Access

Four subthemes relating to CMAT software access to aphasia patients' rehabilitation were identified: usability, computer literacy, real-world hazards and economy. The participants debated the program usability in relation to SLPs, patients, speech lab assistants and care givers of patients, but the discussion particularly focused the SLPs and patients. Both SLPs and patients are the end user of the program. For SLPs, the participants proposed recommendations regarding user-friendly navigation that allowed them to customize the therapy activities with comfort. They also made recommendation about software for containing a wide range of varieties of therapy tasks so that it accommodates diverse situations of the caseload referred. Suggestions were made from five of the participants regarding patient usability profile related to aphasia friendly tasks in native language and culturally appropriate visual material. The ease for navigation was also recognized as a significant consideration in patient usability.

Considering all these recommendation, the participants also posed a question regarding computer literacy of patients. According to their clinical experience, they reported that the majority of patients with aphasia referred to them are middle age and socio-economically the average class who are not that much familiar with digital gadgets and computer literacy in our context. Introducing CMAT to the class of patient will face two fold difficulty; educating computer literacy in general and CMAT software in particular. The participants disapprovingly discussed some strikingly important real-world hazards that prevail in our country, including telecommunication breakdowns, load shedding and laps of internet services. These practical and applied hazards towards implementation of technology based approach may affect the efficacy of treatment. Another indication was economical hazard that was pointed out by the participants in accessing CMAT program in some future time. It was rightly noted that computer implemented programs are only able to be worked on one type of digital gadget, e.g. PC, Android, tablets or smart phones, which may exclude unprivileged patients from accessing this type of therapy. The cost of purchasing software and its licensing fee may also be a financial burden that again excludes some of patients to avail this therapy.

Theme 5. Prognosis Note

Four subthemes were identified relating to the theme of prognosis note: physical presence, remote monitoring, homework activity and maintenance. All the participants agreed that in the traditional method, the physical presence of patients has no alternative regarding efficacy of therapy, but if due to the described reasons, CMAT is mandatory, and then remote monitoring of their feedback and provision of providing prompting cues should be ensured through some live connection with their SLPs, so that mishandling of computer therapy may be rule out. All the participants strongly agreed that inclusion of cues in CMAT program would be an advantage for patients to obtain face-to-face session like facility. Again they were of view that still more is needed for a greater variety of features that may reflect the cueing hierarchy which is a feature of traditional aphasia therapy. Two of the participants proposed frequently during discussion that

this cuing set up should be managed and guided under supervision of expert SLPs as it can be problematic for patients with aphasia to do independently in their home. The participants agreed that if remote monitoring of patients' progress is ensured in the CMAT program then it would be an ideal feature. Suggestions involved homework activity for patients and again its monitoring is an important feature.

In traditional methods, homework practice is always there but patients ignore that most of the time because therapist has no contact with patient and has to rely on their own account. All participants further agreed upon the fact that CMAT program may help patients through maintaining therapy for long time in as home practice of what they have learned in face-to-face sessions of aphasia treatment. In this way intensity of practice could be ensured in chronic aphasia when prolonged treatment is required. Almost all the participants were agreed on the point that the CMAT program has better implication if it introduces at the level of maintenance phase of the treatment. This will manage to rule out the relapse of the disease after completing the treatment and the generalization phases.

Discussion

The purpose of this study was to explore the SLPs' preferences regarding changing trends from traditional methods of aphasia therapy to the CMAT program, in order to understand the lived experiences of the therapist to deal with aphasia therapy preferences. Adapting technology in aphasia rehabilitation services in Pakistan is rare and to the researcher's knowledge this is the first study which consulted SLPs from multiple settings and of varied clinical experiences relating to this topic.

This study focused the SLPs who are decision makers for selection which type of therapy should be implemented for the rehabilitation of lost language. The researcher evaluated the preferences of the SLPs considering their end-user status of the CMAT program; this accomplishes the user centered design approach (De Leo, Gonzales, Battagiri & Leroy, 2011). The current study provides the perception of the participants regarding fundamental issues in adapting latest technology in aphasia therapy, rather than arguing all possible options of the topic. Hence, the research findings of this study are not limited in this sense because general preferences are discussed regarding their changing tendencies in the context. The present study revealed a wide range of ideas that show the trends prevailing in their clinical practices, which were categorized into five themes: traditional rehab activities, auditory and visual input, cost-effective approach, access and prognosis note. The range of commonly emerging research findings is not surprising in the sense that the themes reveal essential constituents of traditional approach that reflects necessary requirements of technology based aphasia therapy approach. This reflection reinforces the research findings that the Pakistani SLPs believe that use of latest technology in the field is a potential alternative in specific context of traditional approach delivery limitations (Hoover & Carney, 2014). But the SLPs' expectations for this program were hazy due to unacquaintedness with introduction of technology in this field and this careful attitude was reflecting in their resistance in adapting new technology, contrary to the findings of

Swales et al. (2016), which indicates that computer based aphasia therapy (CBAT) is replicating the traditional aphasia treatment environment (Swales et al., 2016).

There was a high level of agreement between the SLPs having different academic and clinical affiliations regarding their preferences in treatment options and applicability of the CMAT program in the context. However, there were some differences in their experiences and opinions shared in the group discussions. Although all groups were in agreement with the provision that the CMAT tasks are helpful and beneficial in some later stages of aphasia treatment, like for the maintenance phase, contrary to the results of the study by Kesav et al. (2017) and Meltzer et al. (2018) which show the efficacy of computer based program from first day of treatment and implemented along with traditional therapy, but two of the participants, consistent with results of these two studies, were in favor of implementing the CMAT even in the beginning of the therapy under supervision of an SLP (Kesav, Vrinda, Sukumaran, Sarma & Sylaja, 2017; Meltzer, Baird, Steele & Harvey, 2018). However, as recommended by Mack et al. (2017), they also suggested that the CMAT should have online link with SLP to share live feedback and prompting cues (Mack & Thompson, 2017).

Selecting the treatment options was the topic of group discussion, in all groups and the research-based SLPs were approving the CMAT program's efficacy in all phases of the therapy whereas the clinically-based therapists preferred it in the maintenance phase after the generalization only. One of the clinically-based therapists was taking it as an economical threat for the SLPs in the country where this field is still on the way of paving its recognition. Probably these differences in their opinions are due to their background academic knowledge of professional circumstances. Possibly the research-based SLPs had more international exposure to research academia and had more introductions with latest developments in the field and knowledge of computer technology in aphasia treatment, as compare to the clinically-based SLPs (Schroeder, 2014). But on the other hand the clinically-based SLPs are working practically with patients for a prolonged period of time, so their preference for implementation of the CMAT in the maintenance phase has its practical basis. Also, therapist has opportunity to deal with a large number of patients in their clinical setups using traditional ways of treatment and they come across difficulties and observation regarding behavioral attitudes and practical requirements to cope with them. Apart from this slight difference, the perspectives of all the research participants were very close to each other and nature of the five emerging themes was almost same. The separating of the participant into different groups with same background and then comparing and cumulating their finding ensure the credibility of the study. Similarly the variety of work experiences, workplace settings and academic background ensure transferability of the research findings.

Considering the research finding, possible explanation for these emerging themes is that the participants reflected all possible situations in which they are able to select option for taking suitable decision for aphasia treatment. The course of discussion of the study shows that towards the end of the discussion, in all three groups, the participants expressed their favor for the CMAT, which shows that the changing trends are developing in their minds, but still they are not

ready to practice in speech labs due to the limitations they mentioned for it. Particular reflection was emerged for mishandling of the program during its independent use at home; an extensive discussion reveals that unawareness of technology and lack of formal education in most of the cases with aphasia patients in the context which may decrease patient's compliance. Additionally, the participants represent a wide range of reservations regarding the status of speech and language pathology in Pakistan that is considered to be a root cause of this uncertain stance about the use of new technology in the field. They mention that this field of study is still unrecognized in Pakistan; we could not grow this profession the extent that we can equip our speech labs with latest technology; even insurance companies here do not consider speech therapy as insurable ailment.

All the participants agreed that treatment strategy adapting through programs like the CMAT are cost effective and it can be more beneficial if it can establish personalized therapy of patients. Suggestions were presented regarding features of technology used for aphasia treatment. Findings from Wade et al.'s (2014) research study support the view that appropriateness of technology regarding the requirement of personalized approach of treating patient is a key factor that influence clinical recognition of the tele-practice through implementing computer mediated program or online treatment strategy; however, in our context the program is only on initial discussion and is evaluating how much the SLPs has its acceptability to convert their approach from traditional to latest technology based. Consistent with the study of Wade et al. (2014) it was also appreciated that the SLPs will accept all the pros and cons of the program and it was very much evident from their discussion that they will tolerate the difficulties of technology substantially before rejecting it (Wade, Elliott & Hiller, 2014).

Majority of the participants' suggestions in this study mirror the findings made by van de Sandt-Koenderman (2011), in which the participants suggested that further elaboration and explanation of computer based technology usage are required to achieve improvements and progresses in developing a discourse in favor of technology use in clinical practice across the five emerging themes (van de Sandt-Koenderman, 2011). They were suggesting some type of playful and enjoyable game like activities targeting different aspects of language with some incentive for patient as a motivational tactics, van de Sandt-Koenderman's (2011) also highlighted the importance for functional activities, for relearning lost communication, in computer based aphasia treatment.

Two of the participants of the study were showing their concern about the flexibility of computer based approach so that it could be compatible with requirement of severity level of disease. Again consistent with the findings of the study by Swales et al. (2016), computer programs can assign different therapy activities of different levels of difficulty to patients (Swales et al., 2016), a new computer program titled 'Constant Therapy' also support this finding of the present study ("Constant Therapy - Google Search," n.d.). All the participants reported that the striking feature of the traditional method is motivation through appropriate feedback; they require the same feature from the CMAT program, which is consistent with the

previous study that suggested the feedback is well recognized in aphasia rehabilitation field (Chapey, 2008).

One of crucial feature of traditional approach that the participants wanted to be instilled in the CMAT was encouragement which Mountain et al. (2010) also mentioned in their study (Mountain et al., 2010). The participants of the study also felt that prompting cues as feedback that are using in traditional methods are strong and customized that serve the purpose but this may not be the case with computer based programs. Messamer et al. (2013) reported the childish and artificial feedback in iPad apps which is consistent with the findings of present study (Messamer, Ramsberger, & Hardin, 2013).

This discussion prominently shows the SLPs interest in the CMAT program but that is not still thoroughly introduce to them.

Conclusion and Limitations

Although the SLPs are currently practicing the traditional methods of aphasia rehabilitation in their clinical practices but they showed their immersed preferences towards the use of new technology to compete many limitations of the traditional methods. The SLPs favoring traditional approaches that find new technology applications in practice having lots of reservations in mind regarding their professional recognition, acknowledgement and threats to their profession. Considering the positive attitudes towards the limited adaptation of the CMAT and their shared experiences towards the limitations of old ways of treatment it is recommended that SLPs and researchers pay attention towards developing such digital technology based programs for aphasia rehabilitation using computers, laptops, tabs, iPads, Androids or smart phones, in Pakistan.

In Pakistani context, the essential parameters for the development of the CMAT in the Urdu and other regional languages may help and enhance the patients' rehabilitation process for language dysfunction. The researcher had to select the participants from one city due to short of time and for convenience, although the researcher discussed these topics with one of the research-based SLP from Islamabad, telephonically, but she could not take part in group discussion, as one of the limitations of the present study. Although Lahore is a metropolitan city and people from all of the country come here for their jobs and studies, which is de-facto representation of the country.

References

- Agan, J., Koch, L. C., and Rumrill Jr, P. D. 2008. The use of focus groups in rehabilitation research. *Work* 31(2): 259–269.
- Ali, N., Rafi, M. S., Khan, M. S. G., and Mahfooz, U. 2016. Rejuvenating lost communication through script training. *JPMA. The Journal of the Pakistan Medical Association* 66(12): 1671–1671.

- Anderson, J. E. 2017. Treatment of underlying forms and constraint induced auditory training in aphasia: A single case study.
- Beeson, P. M., Bayley, C., Shultz, C., and Rising, K. 2018. Maximising recovery from aphasia with central and peripheral agraphia: The benefit of sequential treatments. *Neuropsychological Rehabilitation*, 1–27.
- Bhogal, S. K., Teasell, R., and Speechley, M. 2003. Intensity of aphasia therapy, impact on recovery. *Stroke* 34(4): 987–993.
- Blom Johansson, M. 2012. *Aphasia and communication in everyday life: Experiences of persons with aphasia, significant others, and speech-language pathologists* (PhD Thesis). Acta Universitatis Upsaliensis.
- Borley, G., and Hardy, S. 2017. A qualitative study on becoming cared for in Alzheimer's disease: The effects to women's sense of identity. *Aging & Mental Health* 21(10): 1017–1022.
- Braun, V., and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3(2): 77–101.
- Breitenstein, C., Grewe, T., Flöel, A., Ziegler, W., Springer, L., Martus, P., ... Haeusler, K. G. 2017. Intensive speech and language therapy in patients with chronic aphasia after stroke: A randomised, open-label, blinded-endpoint, controlled trial in a health-care setting. *The Lancet*, 389(10078): 1528–1538.
- Carstoiu, D., Oltean, V. E., Nica, S. M., and Spiridon, G. 2017. A cloud-based architecture proposal for rehabilitation of aphasia patients. *Therapy* 9:10.
- Cherney, L. R., Patterson, J. P., and Raymer, A. M. 2011. Intensity of aphasia therapy: Evidence and efficacy. *Current Neurology and Neuroscience Reports* 11(6): 560.
- Code, C., and Heron, C. 2003. Services for aphasia, other acquired adult neurogenic communication and swallowing disorders in the United Kingdom, 2000. *Disability and Rehabilitation* 25(21): 1231–1237.
- Code, C., and Petheram, B. 2011. Delivering for aphasia. *International Journal of Speech-Language Pathology* 13(1): 3–10.
- Coleman, J. J., Frymark, T., Franceschini, N. M., and Theodoros, D. G. 2015. Assessment and treatment of cognition and communication skills in adults with acquired brain injury via telepractice: A systematic review. *American Journal of Speech-Language Pathology* 24(2): 295–315.
- Constant Therapy - Google Search. (2018). Retrieved January 18, 2018, from <https://www.constanttherapy.com/>
- Creswell, J. W., and Poth, C. N. 2017. *Qualitative inquiry and research design: Choosing among five approaches*. London: Sage publications.
- Cubit, K. A., and Meyer, C. 2011. Aging in Australia. *The Gerontologist* 51(5): 583–589.
- De Leo, G., Gonzales, C. H., Battagiri, P., & Leroy, G. 2011. A smart-phone application and a companion website for the improvement of the communication skills of children with

- autism: Clinical rationale, technical development and preliminary results. *Journal of Medical Systems* 35(4): 703–711.
- Des Roches, C. A., and Kiran, S. 2017. Technology-based rehabilitation to improve communication after acquired brain injury. *Frontiers in Neuroscience* 11: 382.
- Des Roches, C. A., Mitko, A., and Kiran, S. 2017. Relationship between self-administered cues and rehabilitation outcomes in individuals with aphasia: Understanding individual responsiveness to a technology-based rehabilitation program. *Frontiers in Human Neuroscience* 11.
- Dickey, L., Kagan, A., Lindsay, M. P., Fang, J., Rowland, A., and Black, S. 2010. Incidence and profile of inpatient stroke-induced aphasia in Ontario, Canada. *Archives of Physical Medicine and Rehabilitation* 91(2): 196–202.
- Dunkley, C., Pattie, L., Wilson, L., and McAllister, L. 2010. A comparison of rural speech-language pathologists' and residents' access to and attitudes towards the use of technology for speech-language pathology service delivery. *International Journal of Speech-Language Pathology* 12(4): 333–343.
- Eatough, V., and Smith, J. A. 2017. Interpretative phenomenological analysis. *The SAGE Handbook of Qualitative Research in Psychology* 193.
- Fairweather, G. C., Lincoln, M. A., and Ramsden, R. 2016. Speech-language pathology teletherapy in rural and remote educational settings: Decreasing service inequities. *International Journal of Speech-Language Pathology* 18(6): 592–602.
- Faris, N. 2017. Leadership in an Australian context: Highlighting a qualitative investigation with construct validity support. *The Qualitative Report* 22(5): 1420–1438.
- Freckmann, A., Hines, M., and Lincoln, M. 2017. Clinicians' perspectives of therapeutic alliance in face-to-face and telepractice speech-language pathology sessions. *International Journal of Speech-Language Pathology* 19(3): 287–296.
- Gallacher, K. I., May, C. R., Langhorne, P., and Mair, F. S. 2018. A conceptual model of treatment burden and patient capacity in stroke. *BMC Family Practice* 19(1): 9.
- Gauthier, L. V., Kane, C., Borstad, A., Strahl, N., Uswatte, G., Taub, E., ... Mark, V. 2017. Video Game Rehabilitation for Outpatient Stroke (ViGoROUS): Protocol for a multi-center comparative effectiveness trial of in-home gamified constraint-induced movement therapy for rehabilitation of chronic upper extremity hemiparesis. *BMC Neurology* 17(1): 109.
- Hall, N., Boisvert, M., and Steele, R. 2013. Telepractice in the assessment and treatment of individuals with aphasia: A systematic review. *International Journal of Telerehabilitation* 5(1): 27.
- Hannes, K., and Bennett, S. 2017. Understanding evidence from research qualitative. *Evidence-Based Practice Across the Health Professions-E-Pub*, 226.
- Hansen, T. N., Bjornsen, A. L., and DeVeney, S. L. 2017. Use of tablet technology: A pilot program for graduate students in speech-language pathology. *Teaching and Learning in Communication Sciences & Disorders* 1(1): 2.

- Hoover, E. L., and Carney, A. 2014. Integrating the iPad into an intensive, comprehensive aphasia program. In *seminars in speech and language* 35: 25–37. Thieme Medical Publishers.
- Husbands, S., Jowett, S., Barton, P., and Coast, J. 2017. How qualitative methods can be used to inform model development. *PharmacoEconomics* 35(6): 607–612.
- Katz, R. C. 2010. Computers in the treatment of chronic aphasia. In *Seminars in speech and language* 31: 034–041. Thieme Medical Publishers.
- Kelly, H., Kennedy, F., Britton, H., McGuire, G., and Law, J. 2016. Narrowing the “digital divide”—facilitating access to computer technology to enhance the lives of those with aphasia: A feasibility study. *Aphasiology* 30(2–3): 133–163.
- Kesav, P., Vrinda, S. L., Sukumaran, S., Sarma, P. S., and Sylaja, P. N. 2017. Effectiveness of speech language therapy either alone or with add-on computer-based language therapy software (Malayalam version) for early post stroke aphasia: A feasibility study. *Journal of the Neurological Sciences* 380: 137–141.
- Konnerup, U. 2018. Inclusive digital technologies for people with communication disabilities. In *The Digital Turn in Higher Education*, 193–208. Wiesbaden: Springer.
- Kozin, A. V. 2018. Empirical phenomenology for the study of consecutive interpreting. In *Consecutive Interpreting*, 67–106. Wiesbaden: Springer.
- Kurland, J., Wilkins, A. R., and Stokes, P. 2014. iPractice: Piloting the effectiveness of a tablet-based home practice program in aphasia treatment. In *Seminars in speech and language* 35: 51–64. Thieme Medical Publishers.
- Lee, J., Fowler, R., Rodney, D., Cherney, L., and Small, S. L. 2010. IMITATE: An intensive computer-based treatment for aphasia based on action observation and imitation. *Aphasiology* 24(4): 449–465.
- Lucchese, G., Pulvermüller, F., Stahl, B., Dreyer, F., and Mohr, B. 2017. P 67 Electrophysiological correlates of language improvements after intensive language therapy in patients with chronic post-stroke aphasia. *Clinical Neurophysiology* 128(10): 360–361.
- Mack, J. E., and Thompson, C. K. 2017. Recovery of online sentence processing in aphasia: Eye movement changes resulting from treatment of underlying forms. *Journal of Speech, Language, and Hearing Research* 60(5): 1299–1315.
- Manasco, H. 2017. *Introduction to neurogenic communication disorders*. Massachusetts: Jones & Bartlett Publishers.
- Marzáñ-Rodríguez, M., Varas-Díaz, N., and Neilands, T. 2015. Qualitative contributions to a randomized controlled trial addressing HIV/AIDS-stigma in medical students. *Qualitative Report* 20(12): 2012.
- Mashima, P. A., and Doarn, C. R. 2008. Overview of telehealth activities in speech-language pathology. *Telemedicine and E-Health* 14(10): 1101–1117.

- McCue, M., Fairman, A., and Pramuka, M. 2010. Enhancing quality of life through telerehabilitation. *Physical Medicine and Rehabilitation Clinics of North America* 21(1): 195–205.
- McKelvey, M. L., Hux, K., Dietz, A., and Beukelman, D. R. 2010. Impact of personal relevance and contextualization on word-picture matching by people with aphasia. *American Journal of Speech-Language Pathology* 19(1): 22–33.
- Meltzer, J. A., Baird, A. J., Steele, R. D., and Harvey, S. J. 2018. Computer-based treatment of poststroke language disorders: A non-inferiority study of telerehabilitation compared to in-person service delivery. *Aphasiology* 32(3): 290–311.
- Messamer, P., Ramsberger, G., and Hardin, K. 2013. Beyond the childish: Adapting iPad apps for use with adult clients. In *Poster presented at: IMASH conference*, 3–5.
- Moffatt, K., Pourshahid, G., and Baecker, R. M. 2017. Augmentative and alternative communication devices for aphasia: The emerging role of “smart” mobile devices. *Universal Access in the Information Society* 16(1): 115–128.
- Mohr, B., Stahl, B., Berthier, M. L., and Pulvermüller, F. 2017. Intensive communicative therapy reduces symptoms of depression in chronic nonfluent aphasia. *Neurorehabilitation and Neural Repair*, doi: 1545968317744275.
- Mountain, G., Wilson, S., Eccleston, C., Mawson, S., Hammerton, J., Ware, T., ... Harris, N. 2010. Developing and testing a telerehabilitation system for people following stroke: Issues of usability. *Journal of Engineering Design* 21(2–3): 223–236.
- Palmer, R., Enderby, P., Cooper, C., Latimer, N., Julius, S., Paterson, G., Hilton, R. 2012. Computer therapy compared with usual care for people with long-standing aphasia poststroke. *Stroke* 43(7): 1904–1911.
- Palmer, R., Enderby, P., and Hawley, M. 2007. Addressing the needs of speakers with longstanding dysarthria: Computerized and traditional therapy compared. *International Journal of Language & Communication Disorders* 42(sup1): 61–79.
- Parrish, J. 2014. Art and aphasia: A literary review and exhibition.
- Patterson, J., Raymer, A., and Cherney, L. 2017. Treatment intensity in aphasia rehabilitation. *Aphasia Rehabilitation: Clinical Challenges* 291.
- Pema, W. T. 2016. Aphasia-overview and teaching strategies. *European Journal of Special Education Research*.
- Peterson, B. C. 2010. The media adoption stage model of technology for art therapy. *Art Therapy* 27(1): 26–31.
- Pulvermüller, F., and Berthier, M. L. 2008. Aphasia therapy on a neuroscience basis. *Aphasiology* 22(6): 563–599.
- Raglio, A., Oasi, O., Gianotti, M., Rossi, A., Goulene, K., and Stramba-Badiale, M. 2016. Improvement of spontaneous language in stroke patients with chronic aphasia treated with music therapy: A randomized controlled trial. *International Journal of Neuroscience* 126(3): 235–242.

- Ramsberger, G., and Marie, B. 2007. Self-administered cued naming therapy: A single-participant investigation of a computer-based therapy program replicated in four cases. *American Journal of Speech-Language Pathology* 16(4): 343–358.
- Raymer, A. 2009. Constraint-induced language therapy: a systematic review. *The ASHA Leader* 14(2): 26–27.
- Redmond, R. A., and Curtis, E. A. 2009. Focus groups: Principles and process. *Nurse Researcher* 16(3): 57–69.
- Rose, M., Ferguson, A., Power, E., Togher, L., and Worrall, L. 2014. Aphasia rehabilitation in Australia: Current practices, challenges and future directions. *International Journal of Speech-Language Pathology* 16(2): 169–180.
- Rose, M. L., Cherney, L. R., and Worrall, L. E. 2013. Intensive comprehensive aphasia programs: An international survey of practice. *Topics in Stroke Rehabilitation* 20(5): 379–387.
- Schroeder, O. L. 2014. *Doctoral shortages in speech-language pathology: A mixed-methods study of program expectations and professional needs* (PhD Thesis). Walden University.
- Segismundo, M. C. P. 2017. *Increasing spontaneous verbalization in chronic aphasia: Enhanced protocol of constraint induced aphasia therapy* (PhD Thesis). Gallaudet University.
- Shamim, H., Naz, S., and Khan, M. S. G. 2017. Development of Verbal Expressive Skills Management Programme for Patients with Broca's Aphasia. *Health Sciences*, 6(6): 138–143.
- Shamim, H., Naz, S., and Tariq, S. 2017. Spontaneous speech and comprehension management of patients with Broca's aphasia using mobile app programme. *International Journal of Rehabilitation Sciences (IJRS)* 6(01).
- Stahl, B., Mohr, B., Büscher, V., Dreyer, F. R., Lucchese, G., and Pulvermüller, F. 2018. Efficacy of intensive aphasia therapy in patients with chronic stroke: A randomised controlled trial. *J Neurol Neurosurg Psychiatry*, jnnp–2017.
- Stahl, B., Mohr, B., Dreyer, F. R., Lucchese, G., and Pulvermüller, F. 2017. Communicative-pragmatic assessment is sensitive and time-effective in measuring the outcome of aphasia therapy. *Frontiers in Human Neuroscience* 11.
- Steele, R. 2013. Telepractice in the Assessment and Treatment of Individuals with Aphasia: A systematic review.
- Stewart, D. W., and Shamdasani, P. N. 2014. *Focus groups: Theory and practice* 20. London: Sage publications.
- Swales, M. A., Hill, A. J., and Finch, E. 2016. Feature rich, but user-friendly: Speech pathologists' preferences for computer-based aphasia therapy. *International Journal of Speech-Language Pathology* 18(4): 315–328.
- Terry, G., Hayfield, N., Clarke, V., and Braun, V. 2017. Thematic analysis. *The Sage Handbook of Qualitative Research in Psychology* 17.
- Theodoros, D. 2012. A new era in speech-language pathology practice: Innovation and diversification. *International Journal of Speech-Language Pathology* 14(3): 189–199.

- Thiel, L., Sage, K., and Conroy, P. 2015. Retraining writing for functional purposes: A review of the writing therapy literature. *Aphasiology* 29(4): 423–441.
- Tucker, J. K. 2012. Perspectives of speech-language pathologists on the use of telepractice in schools: Quantitative survey results. *International Journal of Telerehabilitation* 4(2): 61.
- van de Sandt-Koenderman, W. M. E. 2011. Aphasia rehabilitation and the role of computer technology: Can we keep up with modern times? *International Journal of Speech-Language Pathology* 13(1): 21–27.
- Van Manen, M. 2016. *Phenomenology of practice: Meaning-giving methods in phenomenological research and writing*. London: Routledge.
- Varley, R. 2011. Rethinking aphasia therapy: A neuroscience perspective. *International Journal of Speech-Language Pathology* 13(1): 11–20.
- Wade, V. A., Elliott, J. A., and Hiller, J. E. 2014. Clinician acceptance is the key factor for sustainable telehealth services. *Qualitative Health Research* 24(5): 682–694.
- Walker, W. 2007. Ethical considerations in phenomenological research. *Nurse Researcher* 14(3): 36–45.
- Wertz, R. T., de Riesthal, M., Irwin, W. H., and Ross, K. B. 2009. Department of Veterans Affairs' contributions to treatment outcomes research in aphasia. *Aphasiology* 23(9): 1158–1183.
- Youmans, G., Holland, A., Muñoz, M., and Bourgeois, M. 2005. Script training and automaticity in two individuals with aphasia. *Aphasiology* 19(3–5): 435–450.
- Zhang, J., Yu, J., Bao, Y., Xie, Q., Xu, Y., Zhang, J., and Wang, P. 2017. Constraint-induced aphasia therapy in post-stroke aphasia rehabilitation: A systematic review and meta-analysis of randomized controlled trials. *PloS One* 12(8): e0183349.